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(57) Claims

1. A multi-color LED lamp comprising a constitution wherein, inside a tubular housing having a frontal lens mounted onto its front end and a rear end cover onto which a switch and a power supply are mounted attached to its rear end, a circular printed circuit board of an appropriate size is mounted on the side onto which the switch is mounted, a plurality of doughnut-shaped printed circuit boards whose internal diameters are successively increased is placed, at an appropriate distance from the circular printed circuit board, on the side of the frontal lens, a plurality of LEDs, each having a different light spectrum and wave length, is mounted onto these printed circuit boards; wherein the LEDs of each printed circuit board may be switched on selectively or all LEDs may simultaneously be switched on together ~~at the same time~~ by switching the above-mentioned switch.

2. The multi-colored LED lamp according to claim 1, wherein the LEDs mounted onto the circular printed circuit board emit a single color and have a narrow spectrum and the light spectrum of the LEDs mounted onto the doughnut-shaped printed circuit boards become successively broader towards the side of the frontal lens.

Detailed Description of the Invention

[Industrial Application]

The present invention relates to a multi-color LED lamp which can be used in stage lighting, decorative lamps, illumination for advertising, signal displays or as light source for information equipment.

[Description of the Prior Art]

Multi-color displays or lighting fixtures of the constitution shown in FIGs 6 and 7 are known. In this known constitution, (1) is a tubular housing in which an incandescent lamp (2) is mounted via a socket (3), a lens (4) is mounted onto the front of the tubular housing, while a rotational shutter (5) is mounted on an axis (6)

so as to be able to rotate, and a plurality of color filters (7), e.g. red, blue, green, etc, is mounted onto the rotational shutter. Moreover, said tubular housing (1) is supported on both sides by appropriate arms (8), while said arms are fixed to an appropriate base (9).

In order to emit light of the desired color with a lighting fixture of this constitution, the shutter (5) is rotated manually or electrically each color filter (7) arrives at a position corresponding to the lens (4), and the incandescent light from the lamp (2) is emitted via the color filters (7) as colored light. However, lighting fixtures of this constitution have a problem that the temperature inside the tubular housing (1) increases tremendously because of the incandescent lamp used; hence a lighting fixture of this constitution cannot be used for a long period and the color filters discolor or deform easily because of the heat. Such lighting fixtures furthermore have a problem that the life span of incandescent lamps is short and that the presence of the shutter poses restrictions regarding the locations in which such lighting fixtures can be installed.

[Problems to be Solved by the Invention]

The present invention is to solve the above-mentioned problems of the prior art lighting fixtures that cannot be used for a ling period because of the increase in temperature and wherein the color filters discolor and deform because of the heat and which are restricted regarding the locations in which they can be installed.

[Means for Solving the Problems]

As specific means for solving the above-mentioned problems, the present invention provides a multi-color LED lamp comprising a constitution wherein, inside a tubular housing having a frontal lens mounted onto its front end and a rear end cover onto which a switch and a power supply are mounted attached to its rear end, a circular printed circuit board of an appropriate size is mounted on the side onto which the switch is mounted, a plurality of doughnut-shaped printed circuit boards whose internal diameters are successively increased is placed, at an appropriate distance from the circular printed circuit board, on the side of the frontal lens, a plurality of LEDs, each having a different light spectrum and wave length, is mounted onto these printed circuit boards; wherein the LEDs of each printed circuit board may be switched on selectively or all LEDs may simultaneously be switched on together ~~at the same time~~ by switching the above-mentioned switch; and wherein it is possible to illuminate with colored light of for example red, blue and green emitted by separately switching on the LEDs mounted onto the respective circuit boards, one printed circuit board at a time, and with light of mixed colors emitted by simultaneously switching on all LEDs ~~at the same time~~, ~~while~~ achieving selective multi-color lighting ~~can selectively be emitted~~ by ~~activating the~~ switching.

[Example]

Hereinafter, the present invention will be explained in still greater detail by referring to the Example described in the Figures; (11) is a tubular housing, onto the rear end of which a rear end cover (12) is mounted and onto the front end of which a waterproofed frontal lens (13) made from a transparent lens or from an acrylic plate is mounted. Inside such a tubular housing (11), a circular printed circuit board (14) of a small diameter is mounted on the side of the rear end cover (12) via a stay (15), and a plurality of doughnut-shaped printed circuit boards (16, 17) whose internal

diameters are successively increased are mounted via stoppers (18, 19), at an appropriate distance from the circular printed circuit board (14), on the side of the frontal lens (13). LEDs (20) emitting a single red light of a narrow spectrum are mounted on the circular printed circuit board (14), LEDs (21) emitting a yellow light of a spectrum slightly broader than that of the red LEDs are mounted onto the doughnut-shaped printed circuit board (16), and LEDs (22) emitting a green light of a spectrum broader than that of the LEDs (12) are mounted onto the doughnut-shaped printed circuit board (17). I.e., LEDs emitting a light of a prescribed color are mounted onto the respective printed circuit boards so that the spectrum becomes successively broader from the side of the cap (12) towards the side of frontal lens.

The stay (15) of the printed circuit board (14) is directly mounted onto a partition plate (23), and a switch (24) is provided in the rear end cover (12) which is constituted so that it can be operated by a control knob (25) protruding from the rear end cover~~;~~. This switch (24) is connected with a power supply (26) as well as with the respective printed circuit boards (14, 16, 17) so that the LEDs mounted on the respective printed circuit boards can be selectively switched on by the switch (24). Moreover, a power supply (26) is mounted onto a mounting plate (27), and respective series resistors (29) are included in a wiring (28) between the switch (24) and the respective printed circuit boards. Furthermore, the tubular housing (11) is supported on both sides of its body by an arm (30) which is approximately shaped in the form of the letter ~~"L""~~"U", while adjusting screws (31) for up and down movement are mounted onto the ends of this arm, ~~which makes it~~it being possible to regulate the direction of the tubular housing (11), i.e. the direction of the lighting, up and down. The other end of this arm is mounted onto a stand (32) via a control nut (33) for regulating the direction of the lighting towards the left or towards the right. Furthermore, (34) is an external lead wire.

The switching circuit of the LEDs of the respective printed circuit boards that are activated by the switch (24) is shown in FIG. 4. A plurality of terminals ~~is~~ are provided at the switch (24), these terminals ~~are~~ being connected with the LEDs (20, 21, 22) mounted onto the respective printed circuit boards~~;~~. ~~for example, by~~ By turning the control knob (25), for example, the LEDs (20) emitting a red light are switched on when terminal ~~"a"~~"a" is connected, the LEDs (21) emitting a yellow light are switched on when terminal ~~"b"~~"b" is connected, the LEDs (22) emitting a green light are switched on when terminal ~~"c"~~"c" is connected, and all LEDs (20, 21, 22) emitting light of a mixed color are simultaneously switched on ~~at the same time~~ when terminal ~~"d"~~"d" is connected.

When an array of a plurality of LED lamps is switched on to simultaneously emit the same color ~~at the same time~~, the lamps are connected according to the simplified circuit diagram shown in FIG. 5. In this Figure, (35) is a DC power supply and a flasher unit, an operating panel (36) ~~is~~ being connected to this power supply~~;~~. ~~this~~ This operating panel~~, which addresses~~ that ~~drive~~ addresses the LEDs (20 to 22) mounted onto the respective printed circuit boards, uses electronic flashing devices ~~and makes~~, thus it being possible to monitor the address status of the LEDs (20 to 22). Moreover, a connector (37) is connected to the power supply (35), and the plurality of LED lamps ~~is~~ are connected via this connector. In this case, since the operating panel (36) addresses the LEDs, ~~therefore,~~ it is not necessary to mount the

switch (24) in the respective LED lamps. The required number of lead lines (38) is wired via the connector (37), the wiring is connected in parallel so that the LEDs (20 to 22) can be switched on separately for the different colors corresponding to these lead lines. ~~This type of wiring~~ Such a connection ~~makes it possible to~~enables ~~operate~~ simultaneous operation of a plurality of LED lamps ~~at the same time from~~with ~~the~~ a single operating panel. Further, the lamps can be operated by indoor ultrasonic remote control ~~when~~ by mounting an electronic power input unit for circuit switching ~~is mounted~~ inside the respective lamps instead of the switch.

[Effect of the Invention]

As described above, the multi-color LED lamp ~~related~~ according to the present invention, by virtue of its constitution, wherein LEDs of different colors are placed in stages from the centre towards the outside, the color LEDs are mounted so that their light spectrum is successively broadened starting from the centre, and these LEDs are addressed by a switch, has the effect of obtaining the desired lighting by ~~merely~~ simply switching on the LEDs of the desired color without requiring any shutter or color filter etc. as in the prior art.

Other effects of the invention are that the lamps can be used for a long ~~durations~~ period because the LEDs used as a light source generate remarkably little heat and that these lamps can be installed without any restrictions regarding the locations in which they are to be installed.

A further effect of the invention is that a plurality of LED lamps can be addressed by ~~a single operating~~ operation at one site ~~[panel]~~ because multiple colors can be displayed by selectively switching the LEDs.

Brief Description of the Drawings

FIG. 1 is a simplified cross-sectional view of ~~a simplified representation of~~ a multi-color LED lamp according to the present invention.

FIG. 2 is the cross-sectional view II-II in FIG. 1.

FIG. 3 is a partial rear view of the above-mentioned LED lamp.

FIG. 4 is a simplified circuit diagram of the same LED lamp.

FIG. 5 is a simplified circuit diagram for simultaneously addressing a plurality of LED lamps ~~at the same time~~.

FIG. 6 is a simplified side view of a lighting fixture according to the prior art.

FIG. 7 is a front view of the same lighting fixture.

(1)	tubular housing
(12)	rear end cover
(13)	frontal lens
(15)	stay
(14)	circular printed circuit board
(16, 17)	doughnut-shaped printed circuit boards
(18, 19)	stoppers
(20)	red LEDs
(21)	yellow LEDs
(22)	green LEDs
(23)	partition plate
(24)	switch

(25) control knob
(26) power supply
(27) mounting plate
(28) wiring